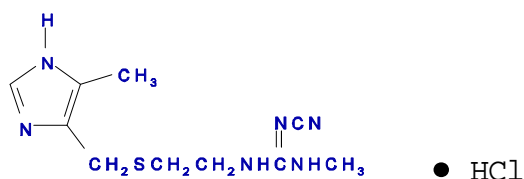


CIMETIDINE HYDROCHLORIDE INJECTION

DESCRIPTION

Cimetidine is a histamine H₂-receptor antagonist. Chemically it is N"-cyano- N-methyl- N'-[2-[[(5-methyl-1 H-imidazol-4-yl)methyl]thio]-ethyl]-guanidine. The molecular formula for cimetidine hydrochloride is C₁₀H₁₆N₆S•HCl; and the molecular weight is 288.80. The structural formula of cimetidine hydrochloride is:



Cimetidine hydrochloride contains an imidazole ring, and is chemically related to histamine. Cimetidine has a bitter taste and characteristic odor.

Solubility Characteristics: Cimetidine hydrochloride is freely soluble in water, soluble in alcohol, very slightly soluble in chloroform and practically insoluble in ether.

Cimetidine hydrochloride injection is a sterile aqueous solution (pH of 3.8 to 6) intended for IM/IV use. Each mL contains cimetidine hydrochloride equivalent to 150 mg of cimetidine; phenol, 5 mg.

[Note: Include information as required by 21 CFR 201.100(b)(5)(iii)]

CLINICAL PHARMACOLOGY

Cimetidine competitively inhibits the action of histamine at the histamine H₂ receptors of the parietal cells and thus is a histamine H₂-receptor antagonist.

Cimetidine is not an anticholinergic agent. Studies have shown that cimetidine inhibits both daytime and nocturnal basal gastric acid secretion. Cimetidine also inhibits gastric acid secretion stimulated by food, histamine, pentagastrin, caffeine and insulin.

Antisecretory Activity

1) Acid Secretion: *Nocturnal*: Cimetidine 800 mg orally at bedtime reduces mean hourly H^+ activity by greater than 85% over an eight hour period in duodenal ulcer patients, with no effect on daytime acid secretion. Cimetidine 1600 mg orally h.s. produces 100% inhibition of mean hourly H^+ activity over an eight hour period in duodenal ulcer patients, but also reduces H^+ activity by 35% for an additional five hours into the following morning. Cimetidine 400 mg b.i.d. and 300 mg q.i.d. decrease nocturnal acid secretion in a dose-related manner, i.e., 47% to 83% over a six to eight hour period and 54% over a nine hour period, respectively.

Food Stimulated: During the first hour after a standard experimental meal, oral cimetidine 300 mg inhibited gastric acid secretion in duodenal ulcer patients by at least 50%. During the subsequent two hours cimetidine inhibited gastric acid secretion by at least 75%.

The effect of a 300 mg breakfast dose of cimetidine continued for at least four hours and there was partial suppression of the rise in gastric acid secretion following the luncheon meal in duodenal ulcer patients. This suppression of gastric acid output was enhanced and could be maintained by another 300 mg dose of cimetidine given with lunch.

In another study, cimetidine 300 mg given with the meal increased gastric pH as compared with placebo.

| Mean Gastric pH | | |
|-----------------|------------|---------|
| | Cimetidine | Placebo |
| 1 hour | 3.5 | 2.6 |
| 2 hours | 3.1 | 1.6 |
| 3 hours | 3.8 | 1.9 |
| 4 hours | 6.1 | 2.2 |

24-Hour Mean H⁺ Activity: Cimetidine 800 mg h.s., 400 mg b.i.d. and 300 mg q.i.d. all provide a similar, moderate (less than 60%) level of 24-hour acid suppression. However, the 800 mg h.s. regimen exerts its entire effect on nocturnal acid, and does not affect daytime gastric physiology.

Chemically Stimulated: Oral cimetidine significantly inhibited gastric acid secretion stimulated by betazole (an isomer of histamine), pentagastrin, caffeine and insulin as follows:

| Stimulant | Stimulant Dose | Cimetidine | % Inhibition |
|--------------|----------------------|---------------|------------------|
| Betazole | 1.5 mg/kg (sc) | 300 mg (po) | 85% at 2 1/2 hrs |
| Pentagastrin | 6 mcg/kg/hr(IV) | 100 mg/hr(IV) | 60% at 1 hour |
| Caffeine | 5 mg/kg/hr (IV) | 300 mg (po) | 100% at 1 hour |
| Insulin | 0.03 units/kg/hr(IV) | 100 mg/hr(IV) | 82% at 1 hour |

When food and betazole were used to stimulate secretion, inhibition of hydrogen ion concentration usually ranged from 45% to 75% and the inhibition of volume ranged from 30% to 65%.

Parenteral administration also significantly inhibits gastric acid secretion. In a crossover study involving patients with active or healed duodenal or gastric ulcers, either continuous I.V. infusion of cimetidine 37.5 mg/hour (900 mg/day) or intermittent injection of cimetidine 300 mg q6h (1200 mg/day) maintained gastric pH above 4.0 for more than 50% of the time under steady-state conditions.

2) Pepsin: Oral cimetidine 300 mg reduced total pepsin output as a result of the decrease in volume of gastric juice.

3) Intrinsic Factor: Intrinsic factor secretion was studied with betazole as a stimulant. Oral cimetidine 300 mg inhibited the rise in intrinsic factor concentration produced by betazole, but some intrinsic factor was secreted

at all times.

Other

Lower Esophageal Sphincter Pressure and Gastric Emptying
Cimetidine has no effect on lower esophageal sphincter (LES) pressure or the rate of gastric emptying.

Pharmacokinetics The half-life of cimetidine is approximately 2 hours. Both oral and parenteral (I.V. or I.M.) administration provide comparable periods of therapeutically effective blood levels; blood concentrations remain above that required to provide 80% inhibition of basal gastric acid secretion for 4 to 5 hours following a dose of 300 mg.

Steady-state blood concentrations of cimetidine with continuous infusion of cimetidine hydrochloride are determined by the infusion rate and clearance of the drug in the individual patient. In a study of peptic ulcer patients with normal renal function, an infusion rate of 37.5 mg/hour produced average steady-state plasma cimetidine concentrations of about 0.9 mcg/mL. Blood levels with other infusion rates will vary in direct proportion to the infusion rate.

The principal route of excretion of cimetidine is the urine. Following parenteral administration, most of the drug is excreted as the parent compound; following oral administration, the drug is more extensively metabolized, the sulfoxide being the major metabolite. Following a single oral dose, 48% of the drug is recovered from the urine after 24 hours as the parent compound. Following I.V. or I.M. administration, approximately 75% of the drug is recovered from the urine after 24 hours as the parent compound.

Clinical Trials

Duodenal Ulcer

Cimetidine has been shown to be effective in the treatment of active duodenal ulcer and, at reduced dosage, in maintenance therapy following healing of active ulcers.

Active Duodenal Ulcer: Cimetidine accelerates the rate of duodenal ulcer healing. Healing rates reported in U.S. and foreign controlled trials with oral cimetidine are summarized below,

beginning with the regimen providing the lowest nocturnal dose.

| Duodenal Ulcer Healing Rates With Various Oral Cimetidine Dosage Regimens * | | | | |
|--|------------------|------------------|----------------|-----------------|
| REGIMEN | 300 mg q.i.d. | 400 mg b.i.d. | 800 mg h.s. | 1600 mg h.s. |
| Week 4 | 68% | 73% | 80% | 86% |
| Week 6 | 80% | 80% | 89% | -- |
| Week 8 | -- | 92% | 94% | -- |
| * Averages from controlled clinical trials. | | | | |

A U.S., double-blind, placebo-controlled, dose-ranging study demonstrated that all once-daily at bedtime (h.s.) cimetidine regimens were superior to placebo in ulcer healing and that cimetidine 800 mg h.s. healed 75% of patients at four weeks. The healing rate with 800 mg h.s. was significantly superior to 400 mg h.s. (66%) and not significantly different from 1600 mg h.s. (81%).

In the U.S. dose-ranging trial, over 80% of patients receiving cimetidine 800 mg h.s. experienced nocturnal pain relief after one day. Relief from daytime pain was reported in approximately 70% of patients after two days. As with ulcer healing, the 800 mg h.s. dose was superior to 400 mg h.s. and not different from 1600 mg h.s.

In foreign, double-blind studies with cimetidine 800 mg h.s., 79% to 85% of patients were healed at four weeks.

While short-term treatment with cimetidine can result in

complete healing of the duodenal ulcer, acute therapy will not prevent ulcer recurrence after cimetidine has been discontinued. Some follow-up studies have reported that the rate of recurrence once therapy was discontinued was slightly higher for patients healed on cimetidine than for patients healed on other forms of therapy; however, the cimetidine-treated patients generally had more severe disease.

Maintenance Therapy in Duodenal Ulcer: Treatment with a reduced dose of cimetidine has been proven effective as maintenance therapy following healing of active duodenal ulcers.

In numerous placebo-controlled studies conducted worldwide, the percent of patients with observed ulcers at the end of one year's therapy with cimetidine 400 mg h.s. was significantly lower (10% to 45%) than in patients receiving placebo (44% to 70%). Thus, from 55% to 90% of patients were maintained free of observed ulcers at the end of one year with cimetidine 400 mg h.s.

Factors such as smoking, duration and severity of disease, gender, and genetic traits may contribute to variations in actual percentages.

Trials of other anti-ulcer therapy, whether placebo-controlled, positive-controlled or open, have demonstrated a range of results similar to that seen with cimetidine.

Active Benign Gastric Ulcer

Cimetidine has been shown to be effective in the short-term treatment of active benign gastric ulcer.

In a multicenter, double-blind U.S. study, patients with endoscopically confirmed benign gastric ulcer were treated with cimetidine 300 mg four times a day or with placebo for six weeks. Patients were limited to those with ulcers ranging from 0.5 to 2.5 cm in size. Endoscopically confirmed healing at six weeks was seen in significantly* more cimetidine-treated patients than in patients receiving placebo, as shown below:

| | Cimetidine | Placebo |
|-----------------|---------------|-------------|
| Week 2 | 14/63 (22%) | 7/63 (11%) |
| Total at Week 6 | 43/65 (66%) * | 30/67 (45%) |

* $p < 0.05$

In a similar multicenter U.S. study of the 800 mg h.s. oral regimen, the endoscopically confirmed healing rates were:

| | Cimetidine | Placebo |
|-----------------|---------------|-------------|
| Total at Week 6 | 63/83 (76%) * | 44/80 (55%) |

* $p < 0.005$

Similarly, in worldwide double-blind clinical studies, endoscopically evaluated benign gastric ulcer healing rates were consistently higher with cimetidine than with placebo.

Prevention of Upper Gastrointestinal Bleeding in Critically Ill Patients

A double-blind, placebo-controlled randomized study of continuous infusion cimetidine was performed in 131 critically ill patients (mean APACHE II score=15.99) to compare the incidence of upper gastrointestinal bleeding, manifested as hematemesis or bright red blood which did not clear after adjustment of the nasogastric tube and a 5 to 10 minute lavage, persistent Gastrocult® positive coffee grounds for 8 consecutive hours which did not clear with 100 cc lavage and/or which were accompanied by a drop in hematocrit of 5 percentage points, or melena, with an endoscopically documented upper gastrointestinal source of bleed, 14% (9/65) of patients treated with cimetidine continuous infusion developed bleeding compared to 33% (22/66) of the placebo group. Coffee grounds was the manifestation of bleeding that accounted for the difference between groups. Another randomized, double-blind placebo-controlled study confirmed these results for an end point of upper gastrointestinal bleeding with a confirmed upper gastrointestinal source noted on endoscopy, and by post hoc

analyses of bleeding episodes between groups.

Pathological Hypersecretory Conditions (such as Zollinger-Ellison Syndrome)

Cimetidine significantly inhibited gastric acid secretion and reduced occurrence of diarrhea, anorexia and pain in patients with pathological hypersecretion associated with Zollinger-Ellison Syndrome, systemic mastocytosis and multiple endocrine adenomas. Use of cimetidine was also followed by healing of intractable ulcers.

INDICATIONS AND USAGE

Cimetidine hydrochloride injection is indicated in:

- (1) **Short-Term Treatment of Active Duodenal Ulcer.** Most patients heal within 4 weeks and there is rarely reason to use cimetidine at full dosage for longer than 6 to 8 weeks (see DOSAGE AND ADMINISTRATION **Duodenal Ulcer**). Concomitant antacids should be given as needed for relief of pain. However, simultaneous administration of oral cimetidine and antacids is not recommended, since antacids have been reported to interfere with the absorption of oral cimetidine.
- (2) **Maintenance Therapy for Duodenal Ulcer Patients at Reduced Dosage After Healing of Active Ulcer.** Patients have been maintained on continued treatment with Cimetidine 400 mg h.s. for periods of up to five years.
- (3) **Short-Term Treatment of Active Benign Gastric Ulcer.** There is no information concerning usefulness of treatment periods of longer than 8 weeks.
- (4) **Prevention of Upper Gastrointestinal Bleeding in Critically Ill Patients.**
- (5) **The Treatment of Pathological Hypersecretory Conditions** (i.e., Zollinger-Ellison Syndrome, systemic mastocytosis, multiple endocrine adenomas).

CONTRAINDICATIONS

Cimetidine is contraindicated for patients known to have

hypersensitivity to the product.

PRECAUTIONS

General: Rare instances of cardiac arrhythmias and hypotension have been reported following the rapid administration of cimetidine hydrochloride injection by intravenous bolus.

Symptomatic response to cimetidine therapy does not preclude the presence of a gastric malignancy. There have been rare reports of transient healing of gastric ulcers despite subsequently documented malignancy.

Reversible confusional states (see ADVERSE REACTIONS) have been observed on occasion, predominantly, but not exclusively, in severely ill patients. Advancing age (50 or more years) and preexisting liver and/or renal disease appear to be contributing factors. In some patients these confusional states have been mild and have not required discontinuation of cimetidine therapy. In cases where discontinuation was judged necessary, the condition usually cleared within 3 to 4 days of drug withdrawal.

Drug Interactions: Cimetidine, apparently through an effect on certain microsomal enzyme systems, has been reported to reduce the hepatic metabolism of warfarin-type anticoagulants, phenytoin, propranolol, nifedipine, chlorthalidopoxide, diazepam, certain tricyclic antidepressants, lidocaine, theophylline and metronidazole, thereby delaying elimination and increasing blood levels of these drugs.

Clinically significant effects have been reported with the warfarin anticoagulants; therefore, close monitoring of prothrombin time is recommended, and adjustment of the anticoagulant dose may be necessary when cimetidine is administered concomitantly. Interaction with phenytoin, lidocaine and theophylline has also been reported to produce adverse clinical effects.

However, a crossover study in healthy subjects receiving either cimetidine 300 mg q.i.d. or 800 mg h.s. concomitantly

with a 300 mg b.i.d. dosage of theophylline extended-release tablets demonstrated less alteration in steady-state theophylline peak serum levels with the 800 mg h.s. regimen, particularly in subjects aged 54 years and older. Data beyond ten days are not available. (Note: All patients receiving theophylline should be monitored appropriately, regardless of concomitant drug therapy.)

Dosage of the drugs mentioned above and other similarly metabolized drugs, particularly those of low therapeutic ratio or in patients with renal and/or hepatic impairment, may require adjustment when starting or stopping concomitantly administered cimetidine to maintain optimum therapeutic blood levels.

Alteration of pH may affect absorption of certain drugs (e.g., ketoconazole). If these products are needed, they should be given at least 2 hours before cimetidine administration.

Additional clinical experience may reveal other drugs affected by the concomitant administration of cimetidine.

Carcinogenesis, Mutagenesis, Impairment of Fertility: In a 24-month toxicity study conducted in rats, at dose levels of 150, 378 and 950 mg/kg/day (approximately 8 to 48 times the recommended human dose), there was a small increase in the incidence of benign Leydig cell tumors in each dose group; when the combined drug-treated groups and control groups were compared, this increase reached statistical significance. In a subsequent 24-month study, there were no differences between the rats receiving 150 mg/kg/day and the untreated controls. However, a statistically significant increase in benign Leydig cell tumor incidence was seen in the rats that received 378 and 950 mg/kg/day. These tumors were common in control groups as well as treated groups and the difference became apparent only in aged rats.

Cimetidine has demonstrated a weak antiandrogenic effect. In animal studies this was manifested as reduced prostate and seminal vesicle weights. However, there was no impairment of mating performance or fertility, nor any harm to the fetus in these animals at doses 8 to 48 times the full therapeutic

dose of cimetidine, as compared with controls. The cases of gynecomastia seen in patients treated for one month or longer may be related to this effect.

In human studies, cimetidine has been shown to have no effect on spermatogenesis, sperm count, motility, morphology or *in vitro* fertilizing capacity.

Pregnancy: Teratogenic Effects: *Pregnancy Category B:* Reproduction studies have been performed in rats, rabbits and mice at doses up to 40 times the normal human dose and have revealed no evidence of impaired fertility or harm to the fetus due to cimetidine. There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproductive studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

Nursing Mothers: Cimetidine is secreted in human milk and, as a general rule, nursing should not be undertaken while a patient is on a drug.

Pediatric Use: Clinical experience in pediatric patients is limited. Therefore, cimetidine therapy cannot be recommended for pediatric patients under 16, unless, in the judgment of the physician, anticipated benefits outweigh the potential risks. In very limited experience, doses of 20 to 40 mg/kg per day have been used.

Immunocompromised Patients: In immunocompromised patients, decreased gastric acidity, including that produced by acid-suppressing agents such as cimetidine, may increase the possibility of a hyperinfection of strongyloidiasis.

ADVERSE REACTIONS

Adverse effects reported in patients taking cimetidine are described below by body system. Incidence figures of 1 in 100 and greater are generally derived from controlled clinical studies.

Gastrointestinal: Diarrhea (usually mild) has been reported in approximately 1 in 100 patients.

CNS: Headaches, ranging from mild to severe, have been reported in 3.5% of 924 patients taking 1600 mg/day, 2.1% of 2,225 patients taking 800 mg/day and 2.3% of 1,897 patients taking placebo. Dizziness and somnolence (usually mild) have been reported in approximately 1 in 100 patients on either 1600 mg/day or 800 mg/day.

Reversible confusional states, e.g., mental confusion, agitation, psychosis, depression, anxiety, hallucinations, disorientation, have been reported predominantly, but not exclusively, in severely ill patients. They have usually developed within 2 to 3 days of initiation of cimetidine therapy and have cleared within 3 to 4 days of discontinuation of the drug.

Endocrine: Gynecomastia has been reported in patients treated for one month or longer. In patients being treated for pathological hypersecretory states, this occurred in about 4% of cases while in all others the incidence was 0.3% to 1% in various studies. No evidence of induced endocrine dysfunction was found, and the condition remained unchanged or returned toward normal with continuing cimetidine treatment.

Reversible impotence has been reported in patients with pathological hypersecretory disorders, e.g., Zollinger-Ellison Syndrome, receiving cimetidine, particularly in high doses, for at least 12 months (range 12 to 79 months, mean 38 months). However, in large-scale surveillance studies at regular dosage, the incidence has not exceeded that commonly reported in the general population.

Hematologic: Decreased white blood cell counts in cimetidine-treated patients (approximately 1 per 100,000 patients), including agranulocytosis (approximately 3 per million patients), have been reported, including a few reports of recurrence on rechallenge. Most of these reports were in patients who had serious concomitant illnesses and received drugs and/or treatment known to produce neutropenia. Thrombocytopenia (approximately 3 per million patients) and, very rarely, cases of pancytopenia or aplastic anemia have also been reported. As with some other H₂-receptor antagonists, there have been extremely rare reports of immune

hemolytic anemia.

Hepatobiliary: Dose-related increases in serum transaminase have been reported. In most cases they did not progress with continued therapy and returned to normal at the end of therapy. There have been rare reports of cholestatic or mixed cholestatic-hepatocellular effects. These were usually reversible. Because of the predominance of cholestatic features, severe parenchymal injury is considered highly unlikely. However, as in the occasional liver injury with other H₂-receptor antagonists, in exceedingly rare circumstances fatal outcomes have been reported.

There has been reported a single case of biopsy-proven periportal hepatic fibrosis in a patient receiving cimetidine.

Rare cases of pancreatitis, which cleared on withdrawal of the drug, have been reported.

Hypersensitivity: Rare cases of fever and allergic reactions including anaphylaxis and hypersensitivity vasculitis, which cleared on withdrawal of the drug, have been reported.

Renal: Small, possibly dose-related increases in plasma creatinine, presumably due to competition for renal tubular secretion, are not uncommon and do not signify deteriorating renal function. Rare cases of interstitial nephritis and urinary retention, which cleared on withdrawal of the drug, have been reported.

Cardiovascular: Rare cases of bradycardia, tachycardia and A-V heart block have been reported with H₂-receptor antagonists.

Musculoskeletal: There have been rare reports of reversible arthralgia and myalgia; exacerbation of joint symptoms in patients with preexisting arthritis has also been reported. Such symptoms have usually been alleviated by a reduction in cimetidine dosage. Rare cases of polymyositis have been reported, but no causal relationship has been established.

Integumental: Mild rash and, very rarely, cases of severe

generalized skin reactions including Stevens-Johnson syndrome, epidermal necrolysis, erythema multiforme, exfoliative dermatitis and generalized exfoliative erythroderma have been reported with H₂-receptor antagonists. Reversible alopecia has been reported very rarely.

Immune Function: There have been extremely rare reports of strongyloidiasis hyperinfection in immunocompromised patients.

OVERDOSAGE

Studies in animals indicate that toxic doses are associated with respiratory failure and tachycardia which may be controlled by assisted respiration and the administration of a beta-blocker.

Reported acute ingestions of up to 20 grams have been associated with transient adverse effects similar to those encountered in normal clinical experience. The usual measures to remove unabsorbed material from the gastrointestinal tract, clinical monitoring and supportive therapy should be employed.

There have been reports of severe CNS symptoms, including unresponsiveness, following ingestion of between 20 and 40 grams of cimetidine, and extremely rare reports following concomitant use of multiple CNS-active medications and ingestion of cimetidine at doses less than 20 grams. An elderly, terminally ill dehydrated patient with organic brain syndrome receiving concomitant antipsychotic agents and cimetidine 4800 mg intravenously over a 24 hour period experienced mental deterioration with reversal on cimetidine discontinuation.

There have been two deaths in adults who have been reported to have ingested over 40 g orally on a single occasion.

DOSAGE AND ADMINISTRATION

Parenteral Administration

In hospitalized patients with pathological hypersecretory conditions or intractable ulcers, or in patients who are unable to take oral medication, cimetidine may be administered parenterally.

The doses and regimen for parenteral administration in patients with GERD have not been established.

Recommendations for Parenteral Administration:

Intramuscular Injection: 300 mg q 6 to 8 hours (no dilution necessary). Transient pain at the site of injection has been reported.

Intravenous Injection: 300 mg q 6 to 8 hours. In some patients it may be necessary to increase dosage. When this is necessary, the increases should be made by more frequent administration of a 300 mg dose, but should not exceed 2400 mg per day. Dilute cimetidine hydrochloride injection, 300 mg, in Sodium Chloride Injection (0.9%) or another compatible I.V. solution (see **Stability of Cimetidine Hydrochloride Injection**) to a total volume of 20 mL and inject over a period of not less than 5 minutes (see PRECAUTIONS).

Intermittent Intravenous Infusion: 300 mg q 6 to 8 hours, infused over 15 to 20 minutes. In some patients it may be necessary to increase dosage. When this is necessary, the increases should be made by more frequent administration of a 300 mg dose, but should not exceed 2400 mg per day.

Dilute cimetidine hydrochloride injection, 300 mg, in at least 50 mL of Dextrose Injection 5%, or another compatible I.V. solution (see **Stability of Cimetidine Hydrochloride Injection**).

Continuous Intravenous Infusion: 37.5 mg/hour (900 mg/day). For patients requiring a more rapid elevation of gastric pH, continuous infusion may be preceded by a 150 mg loading dose administered by I.V. infusion as described above. Dilute 900 mg cimetidine hydrochloride injection in a compatible

I.V. fluid (see **Stability of Cimetidine Hydrochloride Injection**) for constant rate infusion over a 24-hour period. Note: Cimetidine may be diluted in 100 to 1000 mL; however, a volumetric pump is recommended if the volume for 24-hour infusion is less than 250 mL. In one study in patients with pathological hypersecretory states, the mean infused dose of cimetidine was 160 mg/hour with a range of 40 to 600 mg/hour.

These doses maintained the intragastric acid secretory rate at 10 mEq/hour or less. The infusion rate should be adjusted to individual patient requirements.

Stability of Cimetidine Hydrochloride Injection When added to or diluted with most commonly used intravenous solutions, e.g., Sodium Chloride Injection (0.9%), Dextrose Injection (5% or 10%), Lactated Ringer's Injection, Sodium Bicarbonate Injection 5%, cimetidine hydrochloride injection should not be used after more than 48 hours of storage at room temperature.

NOTE: The products accompanying this insert are for IM/IV use only. Much of the following relates to the use of oral cimetidine and is for informational purposes only. See Parenteral Administration (above) for specific dosing recommendations.

Duodenal Ulcer

Active Duodenal Ulcer : Clinical studies have indicated that suppression of nocturnal acid is the most important factor in duodenal ulcer healing (see CLINICAL PHARMACOLOGY -- Acid Secretion). This is supported by recent clinical trials (see **Clinical Trials** -- *Active Duodenal Ulcer*). Therefore, there is no apparent rationale, except for familiarity with use, for treating with anything other than a once daily at bedtime dosage regimen (h.s.).

In a U.S. dose-ranging study of 400 mg h.s., 800 mg h.s. and 1600 mg h.s., a continuous dose response relationship for ulcer healing was demonstrated.

However, 800 mg h.s. is the dose of choice for most patients, as it provides a high healing rate (the difference between

800 mg h.s. and 1600 mg h.s. being small), maximal pain relief, a decreased potential for drug interactions (see **PRECAUTIONS -- Drug Interactions**) and maximal patient convenience. Patients unhealed at four weeks, or those with persistent symptoms, have been shown to benefit from two to four weeks of continued therapy.

It has been shown that patients who both have an endoscopically demonstrated ulcer larger than 1 cm and are also heavy smokers (i.e., smoke one pack of cigarettes or more per day) are more difficult to heal. There is some evidence which suggests that more rapid healing can be achieved in this subpopulation with cimetidine 1600 mg at bedtime. While early pain relief with either 800 mg h.s. or 1600 mg h.s. is equivalent in all patients, 1600 mg h.s. provides an appropriate alternative when it is important to ensure healing within four weeks for this subpopulation. Alternatively, approximately 94% of all patients will also heal in eight weeks with cimetidine 800 mg h.s.

Other cimetidine regimens in the U.S. which have been shown to be effective are: 300 mg four times daily, with meals and at bedtime, the original regimen with which U.S. physicians have the most experience, and 400 mg twice daily, in the morning and at bedtime (see **Clinical Trials -- Active Duodenal Ulcer**).

Concomitant antacids should be given as needed for relief of pain. However, simultaneous administration of oral cimetidine and antacids is not recommended, since antacids have been reported to interfere with the absorption of cimetidine.

While healing with cimetidine often occurs during the first week or two, treatment should be continued for 4 to 6 weeks unless healing has been demonstrated by endoscopic examination.

Maintenance Therapy for Duodenal Ulcer: In those patients requiring maintenance therapy, the recommended adult oral dose is 400 mg at bedtime.

Active Benign Gastric Ulcer

The recommended adult oral dosage for short-term treatment of

active benign gastric ulcer is 800 mg h.s., or 300 mg four times a day with meals and at bedtime. Controlled clinical studies were limited to six weeks of treatment (see **Clinical Trials**). 800 mg h.s. is the preferred regimen for most patients based upon convenience and reduced potential for drug interactions. Symptomatic response to cimetidine does not preclude the presence of a gastric malignancy. It is important to follow gastric ulcer patients to assure rapid progress to complete healing.

Prevention of Upper Gastrointestinal Bleeding

The recommended adult dosing regimen is continuous I.V. infusion of 50 mg/hour. Patients with creatine clearance less than 30 cc/min. should receive half the recommended dose. Treatment beyond 7 days has not been studied.

Pathological Hypersecretory Conditions (such as Zollinger-Ellison Syndrome)

Recommended adult oral dosage: 300 mg four times a day with meals and at bedtime. In some patients it may be necessary to administer higher doses more frequently. Doses should be adjusted to individual patient needs, but should not usually exceed 2400 mg per day and should continue as long as clinically indicated.

Dosage Adjustment for Patients with Impaired Renal Function

Patients with severely impaired renal function have been treated with cimetidine. However, such usage has been very limited. On the basis of this experience the recommended dosage is 300 mg every 12 hours orally or by intravenous injection. Should the patient's condition require, the frequency of dosing may be increased to every 8 hours or even further with caution. In severe renal failure, accumulation may occur and the lowest frequency of dosing compatible with an adequate patient response should be used. When liver impairment is also present, further reductions in dosage may be necessary. Hemodialysis reduces the level of circulating cimetidine. Ideally, the dosage schedule should be adjusted so that the timing of a scheduled dose coincides with the end of hemodialysis.

Patients with creatinine clearance less than 30 cc/min. who are being treated for prevention of upper gastrointestinal bleeding should receive half the recommended dose.

All parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration.

HOW SUPPLIED

- Established Name
- Strength of Dosage Form (300 mg/2 mL)
- Packaging
- Special Handling and Storage recommendations
- Caution: Federal law...
- Revision Date, Manufactured by statement